

Rhodora

JOURNAL OF THE
NEW ENGLAND BOTANICAL CLUB

Conducted and published for the Club, by

BENJAMIN LINCOLN ROBINSON, Editor-in-Chief.

FRANK SHIPLEY COLLINS
MERRITT LYNDON FERNALD
HOLLIS WEBSTER

} Associate Editors.

WILLIAM PENN RICH
EDWARD LOTHROP RAND

} Publication Committee.

Vol. 22.

May, 1920

No. 257.

CONTENTS:

<i>Solidago lepida</i> , var. <i>fallax</i> in Knox Co., Me. <i>N. T. Kidder</i> .	77
<i>Trillium rectistamineum</i> , a valid Species. <i>Harold St. John</i> .	78
Second Report of Committee on Floral Areas	80
Internal glandular Hairs in <i>Dryopteris</i> . <i>Theo. Holm</i>	89
A Flora of the Penobscot Bay Region (Review). <i>M. L. Fernald</i>	91

Boston, Mass.

1052 Exchange Building



Providence, R. I.

Preston and Rounds Co.

RHODORA.—A monthly journal of botany, devoted primarily to the flora of New England. Price, \$2.00 per year, postpaid (domestic and foreign); single copies (if available) 20 cents. Volumes 1-8 or single numbers from them can be supplied at somewhat advanced prices which will be furnished on application. Notes and short scientific papers, relating directly or indirectly to the plants of the northeastern states, will be gladly received and published to the extent that the limited space of the journal permits. Forms will be closed five weeks in advance of publication. Authors (of more than one page of print) will receive 25 copies of the issue in which their contributions appear. Extracted reprints, if ordered in advance, will be furnished at cost.

Address manuscripts and proofs to

B. L. ROBINSON, 3 Clement Circle, Cambridge, Mass.

Subscriptions, advertisements, and business communications to

W. P. RICH, 300 Massachusetts Avenue, Boston, Mass.

Single copies may be had from

E. L. RAND, Corresponding Sec'y N. E. Botanical Club,

1052 Exchange Building, Boston, Mass.

Entered at Boston, Mass., Post Office as Second Class Mail Matter.

KEY TO NEW ENGLAND TREES, Wild and Commonly Cultivated, based primarily upon leaf characters, by J. FRANKLIN COLLINS and HOWARD W. PRESTON. Price 40c. net. PRESTON & ROUNDS Co., Providence, R. I.

CARD-INDEX OF NEW GENERA, SPECIES AND VARIETIES OF AMERICAN PLANTS, 1885 TO DATE.

For American taxonomists and all students of American plants the most important supplement to the Index Kewensis, this catalogue in several ways exceeds the latter work in detail, since it lists not only the flowering plants, but pteridophytes and cellular cryptogams, and includes not merely genera and species, but likewise subspecies, varieties and forms. A work of reference invaluable for larger herbaria, leading libraries, academies of sciences, and other centers of botanical activity. Issued quarterly, at \$15.00 per 1000 cards.

GRAY HERBARIUM of Harvard University,

Cambridge, Mass., U. S. A.

CHECK LIST OF GRAY'S MANUAL, 7th EDITION, compiled by M. A. DAY. Leatherette. Pocket size. Invaluable for collector's memoranda and herbarium records. Published and sold by the GRAY HERBARIUM, Cambridge, Mass. Price postpaid 20 cts. each. Ten copies \$1.50.

MEMOIRS OF THE GRAY HERBARIUM. A series of illustrated quarto papers issued at irregular intervals, sold separately.

Vol. I. Monograph of the genus *Brickellia*, by B. L. Robinson (with 96 text figures effectively illustrating all known species of the genus). Feb. 1917. \$3.00.

Gray Herbarium of Harvard University, Cambridge, Mass.

Advertisements of Nurserymen and Dealers in Botanical and other Scientific Publications are inserted in these pages at the following rates per space of 4 in. by 3-4 in. 1 year \$4.00, 6 months \$2.50.

Rhodora

JOURNAL OF

THE NEW ENGLAND BOTANICAL CLUB

Vol. 22.

May, 1920.

No. 257.

SOLIDAGO LEPIDA, VAR. FALLAX IN KNOX COUNTY, MAINE.

NATHANIEL T. KIDDER.

ISLE AU HAUT is one of the outermost islands of Penobscot Bay, and lies about fifteen miles southwest of Mount Desert. It is botanically interesting both for the plants which grow there and for the number of mainland weeds which have not yet found a footing. Since my first visit in 1901 I have returned every year, and have spent many weeks in botanizing. Isle au Haut is included in the region described by Mr. Albert Frederick Hill in "The Vascular Flora of the Eastern Penobscot Bay Region, Maine," which was published in the Proceedings of the Portland Society of Natural History, Vol. III, Part 2 (1919).

Sometime I hope to publish a list of the plants of Isle au Haut, based on my collections on the island alone. Some of my finds are mentioned in Mr. Hill's Flora, but while his list was in press I was still adding to my collections. It is my hope that the Solidago of my heading may be found on Isle au Haut, as I have found there nearly everything which I have seen on the neighboring islands. To be sure, I have not explored them very thoroughly.

Just off the Northwest shore of Isle au Haut lies a little island known as Nathan's Island. Some three acres in extent, its greatest elevation not more than thirty-five feet above high water, this island must be blessed with very rich soil, for what grows on it at all is in very robust form. The trees are mostly spruce, and in the occasional openings are found much the same plants we find in similar spots

on the larger islands about. On a casual visit to Nathan's September 3, 1917, I was struck by a thriving golden rod of which there were very few plants. I have already commented on the vigor shown by the growth on Nathan's. I very nearly passed those plants by as strong growing *Solidago canadensis*. Fortunately a second impulse led me to bring away one complete and one partial specimen. Prof. Fernald pronounced them to be *Solidago lepida* DC., var. *fallax* Fernald, and referred me to the first article in RHODORA XVII (1915) where on page 9 we read under this variety the range "Newfoundland to British Columbia, south to northern New Brunswick, northern Maine, northern Michigan, Utah and Washington." And Prof. Fernald has written on my sheet "first south of Aroostook Valley."

MILTON, MASSACHUSETTS.

TRILLIUM RECTISTAMINEUM, A VALID SPECIES OF THE SOUTHEASTERN UNITED STATES.

HAROLD ST. JOHN.

IN 1917 R. R. Gates described a new variety of *Trillium*, *T. lanceolatum* Boykin, var. *rectistamineum* Gates. He based it on a series of sheets with imperfect data from the Chapman Herbarium. Gates gives an adequate description, and states¹ that, "This plant, no doubt, constitutes a distinct species, differing from *T. lanceolatum* especially in the petals, anthers, and ovary, but as the specimens available are without locality and only one shows a complete flower, it seems desirable merely to designate this form as above indicated." When the writer reorganized the Trilliums in the Gray Herbarium, three sheets from Georgia, Florida, and Alabama were separated as a very distinct species. By the kindness of Dr. J. M. Greenman it has been possible to compare these with authentic material of *T. lanceolatum* Boykin, var. *rectistamineum* Gates and their identity is unquestionable. The additional material confirms the specific nature of the characters, and gives exact information as to the range of the plant. There is, consequently, no reason for keeping it in

¹ Ann. Mo. Bot. Gard. iv. 48 (1917).

any subordinate category, and the specific combination is made below. It is probable that the Florida specimens referred to by Rendle¹ are of this species.

TRILLIUM rectistamineum (Gates) comb. nov. *T. lanceolatum* Boykin, var. *rectistamineum* Gates, Ann. Mo. Bot. Gard. iv. 48 (1917).—Georgia, northwestern Florida, and Alabama.—GEORGIA: rich woods northwest of Tennille, Washington County, June 14, 1902, R. M. Harper, no. 1,330. FLORIDA: moist slopes in woods, Chattahoochie, March 14, 1901, A. H. Curtiss; near head of rich ravine on Aspalaga Bluff, Gadsden County, March 8, 1909, R. M. Harper, no. 25; Aspalaga, March, 1897, Herb. Chapman. ALABAMA: Buckley.

T. rectistamineum (Gates) St. John has broadly lanceolate petals, 4–6.5 cm. long, 1.2–1.8 cm. broad, the filaments one-quarter the length of the anthers, anthers straight, fruit ovoid, 3-angled, leaves broadly deltoid-lanceolate; while *T. lanceolatum* Boykin acc. to Small has lanceolate petals, long-clawed at the base, 2–5 cm. long, 3–8 mm. wide, the filaments about as long as the anthers, anthers incurved, fruit 6-angled (according to Watson),² leaves lanceolate. *T. rectistamineum* has broadly lanceolate dark purple petals, 4–6.5 cm. long, 1.2–1.8 cm. broad, leaves broadly deltoid-lanceolate, stems glabrous; while *T. viride* Beck has clawed greenish petals, the blade linear or nearly so, the claw usually purplish, leaves ovate, and the stem scabrous at the summit. *T. rectistamineum* has filaments one-quarter the length of the anthers, the connective projecting conspicuously beyond the tips of the anther sacs, petals broadly lanceolate, 4–6.5 cm. long, 1.2–1.8 cm. broad, leaves broadly deltoid-lanceolate; while *T. Underwoodii* Small has filaments not more than one-fifth the length of the anthers, the connective scarcely exceeding the tips of the anther sacs, petals lanceolate or ovate-lanceolate, 4–7 cm. long, 1–2.1 cm. broad, and the leaves ovate or orbicular-ovate. This series of contrasts should be of assistance in distinguishing *Trillium rectistamineum* (Gates) St. John from related species.

GRAY HERBARIUM.

¹ Rendle, A. B. Journ. of Bot. xxix. fourth paragraph 325 (1901).

² Watson, S. Rev. N. Am. Liliaceae, Proc. Am. Acad. Arts and Sci. xiv. 273 (1879).

SECOND REPORT OF THE COMMITTEE ON FLORAL AREAS.

THIS committee published in October and November, 1918, a report on the New England *Ranunculaceae*. We have now prepared a similar report on *Polypodiaceae*, *Schizaceae* and *Osmundaceae*. All our species of these three families are native, none introduced, and they have been extensively collected and reported upon. More material is needed, however, for adequate reports on the lady-fern group. Merely formal varieties and casual hybrids are omitted, as their ranges are not of value here.

PRELIMINARY LISTS OF NEW ENGLAND PLANTS,— XXVII.

[The sign + indicates that an herbarium specimen has been seen; the sign — that a reliable printed record has been found.]

POLYPODIACEAE.	Me.	N. H.	Vt.	Mass.	R. I.	Conn.
<i>Adiantum pedatum</i> L.	+	+	+	+	+	+
× <i>Asplenium ebenoides</i> R. R. Scott			+	+		+
<i>Asplenium montanum</i> Willd. . .						+
“ <i>pinnatifidum</i> Nutt.						—
“ <i>platyneuron</i> (L.) Oakes	+	+	+	+	+	+
“ <i>Ruta-muraria</i> L.			+	+		+
“ <i>Trichomanes</i> L.	+	+	+	+	+	+
“ <i>viride</i> Huds.	+		+			
<i>Athyrium acrostichoides</i> (Sw.) Diels	+	+	+	+	+	+
“ <i>angustifolium</i> (Michx.) Milde		+	+	+		+
“ <i>angustum</i> (Willd.) Presl . .	+	+	+	+	+	+
“ “ <i>var. elatius</i> (Link) Butters	+	+	+	+	+	+
“ “ <i>var. laurentianum</i> Butters	+					
“ “ <i>var. rubellum</i> (Gil- bert) Butters	+	+	+	+	+	+
“ <i>asplenioides</i> (Michx.) Desv.				+	+	+
<i>Camptosorus rhizophyllus</i> (L.) Link	+	—	+	+	+	+

POLYPODIACEAE		Me.	N. H.	Vt.	Mass.	R. I.	Conn.
Cheilanthes lanosa (Michx.) Watt .							+
Cryptogramma Stelleri (Gmel.)							
Prantl		+	+	+	+		+
Cystopteris bulbifera (L.) Bernh. .		+	+	+	+		+
“ fragilis (L.) Bernh.		+	+	+	+	+	+
Dennstaedtia punctilobula (Michx.)							
Moore		+	+	+	+	+	+
Onoclea sensibilis L.		+	+	+	+	+	+
Pellaea atropurpurea (L.) Link. .				+	+	+	+
“ glabella Mett.				+			
Polypodium vulgare L.		+	+	+	+	+	+
Polystichum acrostichoides (Michx.)							
Schott		+	+	+	+	+	+
“ Braunii (Spenner) Fée		+	+	+	+		
Pteritis nodulosa (Michx.) Nieuwl.		+	+	+	+	+	+
Pteridium latiusculum (Desv.) Max-							
on		+	+	+	+	+	+
“ “ var. pseudocauda-							
tum (Clute) Maxon				—	+		
×Thelypteris Boottii (Tuckerm.) Nieuwl.		+	+	+	+		+
Thelypteris cristata (L.) Nieuwl.		+	+	+	+	+	+
“ “ var. Clintoniana							
(D. C. Eaton)							
Weatherby		+	+	+	+		+
“ Dryopteris (L.) Sloss-							
son		+	+	+	+	+	+
“ Filix-mas (L.) Nieuwl.				+			
“ fragrans (L.) Nieuwl.		+	+	+			
“ Goldiana (Hook.)							
Nieuwl.		+	+	+	+		+
“ hexagonoptera							
(Michx.) Weatherby		+	+	+	+	+	+
“ marginalis (L.) Nieuwl.		+	+	+	+	+	+
“ noveboracensis (L.)							
Nieuwl.		+	+	+	+	+	+
“ palustris Schott		+	+	+	+	+	+
“ Phegopteris (L.) Sloss-							
son		+	+	+	+	+	+
“ simulata (Davenp.)							
Nieuwl.		+	+	+	+	+	+

POLYPODIACEAE	Me.	N. H.	Vt.	Mass.	R. I.	Conn.
<i>Thelypteris spinulosa</i> (O. F. Mueller) Nieuwl. . .	+	+	+	+	+	+
“ “ var. <i>concordiana</i> (Davenp.) Weatherby				+		
“ <i>spinulosa</i> var. <i>intermedia</i> (Muhl.) Nieuwl.	+	+	+	+	+	+
“ <i>spinulosa</i> var. <i>americana</i> (Fisch.) Weatherby	+	+	+	+		
<i>Woodsia alpina</i> (Bolton) S. F. Gray			+			
“ <i>glabella</i> R. Br.	+	+	+			
“ <i>ilvensis</i> (L.) R. Br. . . .	+	+	+	+	+	+
“ <i>obtusa</i> (Spreng.) Torr. .	+	+	+	+	+	+
<i>Woodwardia areolata</i> (L.) Moore .	—	+		+	+	+
“ <i>virginica</i> (L.) Sm. . . .	+	+	+	+	+	+
SCHIZAEACEAE ¹						
<i>Lygodium palmatum</i> (Bernh.) Sw. .		+		+	+	+
OSMUNDACEAE						
<i>Osmunda cinnamomea</i> L.	+	+	+	+	+	+
“ “ var. <i>glandulosa</i> Waters					+	
“ <i>Claytoniana</i> L.	+	+	+	+	+	+
“ <i>regalis</i> L., var. <i>spectabilis</i> (Willd.) Gray	+	+	+	+	+	+

GENERALLY DISTRIBUTED SPECIES.

<i>Athyrium angustum</i> , var. <i>rubellum</i>	<i>Thelypteris noveboracensis</i>
<i>Cystopteris fragilis</i>	“ <i>palustris</i>
<i>Dennstaedtia punctilobula</i>	“ <i>spinulosa</i>
<i>Onoclea sensibilis</i>	“ “ var. <i>intermedia</i>
<i>Polypodium vulgare</i>	
<i>Pteridium latiusculum</i>	<i>Osmunda cinnamomea</i>
<i>Thelypteris cristata</i>	“ <i>Claytoniana</i>
“ <i>marginalis</i>	“ <i>regalis</i> , var. <i>spectabilis</i>

¹ In the herbarium of the New England Botanical Club there is a specimen of *Schizaea pusilla* Pursh, distributed by Addison Brown and labelled as collected in Rhode Island by J. W. Congdon. When questioned in regard to it in 1907, Mr. Congdon wrote that he had never collected this species in Rhode Island or anywhere else, but that various specimens of it from New Jersey had passed through his hands in the course of exchanges and that one of these had, no doubt, got wrongly labelled.

These species seem, for the most part, to be distributed very evenly, although somewhat dependent on suitable habitats. *Cystopteris fragilis*, for instance, a plant of shaded rocks or rarely of woodland soil, is not known from Cape Cod, where such conditions are lacking. *Dennstaedtia punctilobula*, *Thelypteris marginalis*, *T. palustris* and *T. spinulosa* are apparently less common in northern Maine than elsewhere. Through them, the ranges grade off into those of the following division.

SPECIES OF RICH SOILS.

Adiantum pedatum	Polystichum acrostichoides
Athyrium acrostichoides	Pteretis nodulosa

These ferns are abundant in rich soils, but avoid the spruce forest and sandy regions. The first three are woodland species, the *Polystichum* frequenting drier situations than the others. *Pteretis nodulosa* is by preference a plant of the richest alluvium, where it grows five or six feet tall. It grows also in moist upland country, especially where there is a trace of lime in the soil. Like the other species of this division, it avoids northwestern and extreme northern Maine and the coastal plain areas of Cape Cod; it also avoids the outer Maine coast east of the Kennebec and all of southeastern Massachusetts, and is rare in eastern Connecticut and Rhode Island (two stations, one now eradicated).

NORTHERN SPECIES.

A	B
Thelypteris Dryopteris	Athyrium angustum, var. laurentianum
“ Phegopteris	Polystichum Braunii
Woodsia ilvensis	Thelypteris spinulosa, var. americana

The species of group A are northern types of wide range in New England and perhaps as well placed with the generally distributed species, but, unlike them, becoming notably less frequent in southern New England. *Thelypteris Dryopteris*, common northward, is rare in eastern Massachusetts and eastern Connecticut and is not reported from Cape Cod nor the southern islands. It has two Rhode Island stations, both in or near Providence, but is known to have been introduced at one of them; and the other is under suspicion. *T. Phegopteris* has a similar range, but is more frequent southward, has four stations in Rhode Island, and has been found during the past

season in Falmouth at the base of Cape Cod. *Woodsia ilvensis*, a plant of sunny, dry ledges, apparently avoids northwestern Maine and southeastern Massachusetts and is known from only a single station in Rhode Island.

Group B is composed of strictly northern plants, confined, except for isolated stations on Mt. Greylock, to comparatively boreal habitats in the northern tier of states. *Athyrium angustum*, var. *laurentianum* was, when first described, known in our region only from extreme eastern Maine in Princeton. It has since been found at three stations in northern Maine. *Polystichum Braunii* grows in ravines and deep woods, usually at an altitude of 1000 feet or more. It has been found on Mt. Greylock, Mass., at many places in the Vermont mountains and in northern New Hampshire, at Grafton, Strong, Temple and New Vineyard in western Maine and at scattered stations on the slopes of mountains in northern Maine. *Thelypteris spinulosa*, var. *americana* has almost the same range, but is much more abundant, as it is a typical plant of the spruce forest at an elevation of 1000 feet or more. It also reaches a splendid development in the spruce woods along the Maine coast from the islands of Penobscot Bay eastward.

SOUTHERN SPECIES.

A

Asplenium platyneuron	Thelypteris cristata, var. Clintoniana
" Trichomanes	"
Athyrium angustum, var. elatius	" hexagonoptera
	" simulata
Woodsia obtusa	

B

Asplenium montanum	Athyrium asplenioides
" pinnatifidum	Cheilanthes lanosa
Lygodium palmatum	

As in the case of the northern species, the southern divide into two groups. Group A comprises species of rather wide distribution in southern New England, which become rarer and occur mostly at low altitudes northward and, with the exception of *Athyrium angustum*, var. *elatius*, reach in that direction no further than south-central Maine. *Asplenium platyneuron* is well known southward, reaching

north to Burlington and St. Johnsbury, Vt., and North Woodstock, N. H. In Maine it is rare, known only from scattered stations, the northernmost of which is Anson and the most eastern Appleton and Union. *Asplenium Trichomanes* grows on ledges of various kinds of rock in southern New England. Further north it seems to prefer calcareous rocks. It is frequent in Vermont, occasional in southern New Hampshire and in western Maine. It apparently ascends to higher altitudes northward than the other species here placed. *Athyrium angustum*, var. *elatius* is known from scattered stations in other states, and along the Maine coast and on the Kennebec and upper Androscoggin Rivers, but not further north. (This generalization is based on 32 records.) *Thelypteris cristata*, var. *Clintoniana* is frequent west of the Connecticut, especially in the Taconic Mountains. It occurs here and there to the east, except in Rhode Island and on Cape Cod, as far as Mt. Desert. *T. hexagonoptera* is frequent in southern New England, occasional in Vermont, rare in New Hampshire (three stations) and occasional in Maine as far east as Charleston in Penobscot Co. *T. simulata* is known in Vermont only from Brattleboro and Hartland, but is occasional in southeastern New Hampshire north to Merrimac and southern Carroll Counties and in Maine along the coast to Southport and inland to Limington. It is abundant in eastern Massachusetts but apparently is less common in Rhode Island and Connecticut. *Woodsia obtusa* is frequent on ledges and in dry soil in southern New England; occasional in Vermont, reaching Burlington and St. Johnsbury; rare in southern New Hampshire; and in Maine known only from Winthrop (H. Metcalf, RHODORA iii. 236. 1901; specimen in herb. N. E. Botanical Club).

Group B consists of species, rare or local with us, which enter New England from the southwest and are confined, except for one New Hampshire station for *Lygodium*, to the three southernmost states. *Asplenium montanum* is known from six scattered stations on granite ledges in Connecticut. *A. pinnatifidum* is reported from Sharon and Southington, Conn. The specimen from Southington in the Gray Herbarium, however, is not *A. pinnatifidum*, but a state of *A. ebenoides* with obtuse segments; that record may be founded on an error in determination. There seems no reason to doubt the Sharon report. *Athyrium asplenioides* is known from the Boston region and from Sandwich, Mass., and from Rhode Island and Con-

necticut, in no case more than 25 miles from the coast. It may prove to be a coastal plain species when better known, but probably one of the heavier and less acid soils rather than the sand-plains. *Cheilanthes lanosa* occurs at a single station on trap cliffs at New Haven, Conn. (G. Van Ingen). *Lygodium palmatum* is found locally in the Connecticut basin as far north as Winchester, N. H., in the Merri-mac Valley in Massachusetts and thence at scattered stations southward to Narragansett Bay. It is not known from Cape Cod.

COASTAL PLAIN SPECIES.

Osmunda cinnamomea, var. glandu-	Woodwardia areolata
losa	" virginica
Pteridium latiusculum, var. pseu-	
docaudatum	

These plants are coastal plain types which, however, for the most part intrude into acid areas further inland than the actual geologic coastal plain. The *Osmunda* has been found only at Barrington, R. I. *Pteridium latiusculum*, var. *pseudocaudatum* has been collected at Needham, Mass., on Cape Cod at Barnstable, Dennis, Brewster and Harwich, and on Nantucket. It has also been reported from the sand-plains in Colchester, Vt. All the New England specimens seen are somewhat transitional and by no means as clearly distinguishable as the material from further south (where the variety entirely replaces the typical form), and often appear like a mere ecological state. *Woodwardia areolata* occurs near the coast from Brownfield and Acton in southwestern Maine southward, penetrating inland in Connecticut to East Hartford, Newington and Middlebury, and occurring also on Nantucket, Martha's Vineyard and Block Island. *W. virginica*, a plant of sphagnous swamps, extends further inland. It appears at scattered localities in western Maine as far north as Chesterville and Belgrade and in the Penobscot valley at Oldtown. It is frequent throughout eastern Massachusetts and occurs in the sandy Springfield region, also at several places in the interior of Connecticut. It is also known at Rutland, Colchester and Franklin in the Champlain valley.

CALCIPHILE SPECIES.

Northern

Asplenium viride	Thelypteris Filix-mas
Cryptogramma Stelleri	" fragrans

*Cystopteris bulbifera**Woodsia alpina**Pellaea glabella*" *glabella**Southern**Asplenium ebnoides**Camptosorus rhizophyllus*" *Ruta-muraria**Pellaea atropurpurea**Athyrium angustifolium**Thelypteris Goldiana*

The term calciphile is here used in a somewhat general sense to cover all species whose ranges are, for the most part, identical with areas of calcareous rock. The actual lime requirements of the different species placed here probably differ considerably. *Asplenium Ruta-muraria*, for instance, is strictly confined to ledges of calcareous rock. *Camptosorus* and *Thelypteris fragrans* occur not uncommonly on other rocks. As shown by tests made by Dr. Edgar T. Wherry, of the Dept. of Agriculture, the former will grow in a weakly acid soil. *Thelypteris Goldiana* and *Athyrium angustifolium* are plants of rich woods, not always visibly associated with any source of lime other than leaf-mold. But it is probable that none of these species live in soils which do not contain soluble calcium compounds.

Since the calcareous areas of New England are chiefly west of the Connecticut River, these species are most abundant there. The valley between the Green Mts. and the Taconics is a rich area for them, and so are Mt. Toby in Massachusetts and Smugglers' Notch and the Willoughby Lake region in Vermont. *Cystopteris bulbifera* is the most widely distributed of these ferns east of the Connecticut, being known from Mt. Toby, from northern Coos Co., N. H., and from most of the calcareous areas in Maine. *Cryptogramma Stelleri* is probably next in abundance among the northern calciphiles, though in dry seasons it is likely to wither away early. It is very rare in western Connecticut, local in Franklin Co., Mass., and in eastern Vermont, and occasional in western Vermont. It has been found at Colebrook, N. H., by Dr. A. S. Pease and at West Paris, Maine, by W. L. Bacon (RHODORA x. 35. 1908).

Asplenium viride has been found at five stations in the Green Mts. of Vermont and in 1917 at Green Mt. on the north branch of the Penobscot in Somerset Co., Maine, by Dr. Harold St. John. *Woodsia glabella* has six Vermont stations and two on ledges along the Androscoggin at Berlin and Gorham, N. H. It also occurs at Moxie Falls, Somerset Co., and Chain of Ponds, Franklin Co., Maine. *W. alpina*

is found only at Queechee Gulf, Smugglers' Notch and Mt. Willoughby in Vermont, though it closely approaches the Maine border in the Aroostook valley, New Brunswick. *Thelypteris Filix-mas* has been found at eight stations in central Vermont, where it thrives best in high pastures and thickets (see E. J. Winslow, *The Male Fern in Vermont*, Am. Fern Journ. vii. 87-90. 1917). *T. fragrans* is a fern of drier ledges (sometimes hardly calcareous) which occurs locally in the Green Mts. south to central Vermont, at Lake Sunapee and in gorges of streams north of the White mountains in New Hampshire and at scattered stations in Oxford, Franklin, Kennebec, Piscataquis and Aroostook Counties, Maine.

The ranges of the two species of *Pellaea* overlap in Vermont, where *P. glabella* is known from six stations from Willoughby Lake to Pownal. *P. atropurpurea* crosses the Connecticut eastward to Mt. Toby and Berlin, Mass. (RHODORA ii. 14. 1900), and occurs at Lincoln, R. I., and Bolton, Conn., while occasional westward.

Asplenium ebenoides is a rare hybrid reported from six places in Vermont, Sheffield, Mass., and Canaan, Berlin and Southington, Conn. *A. Ruta-muraria* is "scarce" on Mt. Toby and local in western Berkshire Co. in Massachusetts, and occasional in western Vermont (with a single station at Willoughby) and western Connecticut, and occurs rarely on the trap ridges of central Connecticut. East of the Connecticut, *Camptosorus* was once found in Winthrop, Maine, by Haven Metcalf (RHODORA iii. 236. 1901). It has been collected at Hudson and Windham, N. H., at Weston and Natick (eradicated) and Needham near Boston, at Brookfield, Amherst and Mt. Toby, Mass., and at Lincoln, R. I., and at a few scattered stations in eastern Connecticut. West of the Connecticut it occurs at numerous stations from New Haven, Conn., to the Canadian border, becoming locally common in the calcareous areas west of the Green Mts.

Athyrium angustifolium is a rich woods calciphile, running north in Vermont to St. Albans and Danville and known east of the Connecticut only at Alstead, N. H., and in the Mt. Toby region. *Thelypteris Goldiana* is a plant of similar habitats, but rather more common and with a wider range east of the Connecticut. It has scattered stations at Mt. Toby and in Worcester Co., Mass., at Alstead and in northern Coos Co., N. H., and in Franklin Co. and at Winthrop and Fairfield farther east in Maine.

MISCELLANEOUS SPECIES.

Athyrium angustum

Thelypteris Boottii

Thelypteris spinulosa, var. concordiana

Athyrium angustum, the dimorphic sun form of the lady-fern group, seems to be absent from large areas, for no obvious reason, unless that it has not been collected in sufficient quantity as yet.

Thelypteris Boottii, now generally regarded as a hybrid between *T. cristata* and *T. spinulosa*, var. *intermedia*, is well distributed but seldom abundant. It seems to prefer swampy places in rich woods areas, but is not reported from northern Maine and northern New Hampshire, nor from Rhode Island. *T. spinulosa*, var. *concordiana* was discovered by Henry A. Purdie and William Brewster at Concord, Mass., in 1902 (RHODORA vi. 313. 1904), and is as yet known certainly only from the type locality.

C. H. KNOWLTON,
W. S. RIPLEY, JR.,
C. A. WEATHERBY.

INTERNAL GLANDULAR HAIRS IN DRYOPTERIS.

THEO. HOLM.

ANATOMICAL studies of the ferns reveal many points of interest, and especially with regard to the arrangement of the various tissues in the stem and stipe. Moreover it is in the ferns that internal, glandular hairs have been observed, and such are described by De Bary¹ as characteristic of *Dryopteris Filix-mas*, and *D. spinulosa*. These hairs were found in the ducts of the rhizome and the base of the petiole. Another type of internal hairs is known from *Pilularia*, *Nymphaeaceae*, *Araceae*, *Rhizophora* and *Limnanthemum*, but these hairs are not glandular.

Concerning the presence of these hairs in the ferns it does not seem that they have been found in the leaf except in the petiole, nor have they been recorded from any of the other species of *Dryopteris*, nor from other genera. Some few years ago, when engaged in studying the anatomy of some of our ferns from living specimens, I found these hairs in the intercellular spaces of the leaf-parenchyma in *Dryopteris*

¹ Vergleichende Anatomie der Vegetationsorgane der Phanerogamen und Farne. Leipzig, 1877, p. 230.

Filix mas (L.) Schott, *D. marginalis* (L.) Gray, *D. spinulosa* (O. F. Müll.) Kuntze, and *D. cristata* (L.) Gray, but not in *D. Thelypteris* (L.) Gray, nor in *D. noveboracensis* (L.) Gray. Furthermore I examined *Polystichum acrostichoides* (Michx.) Schott, some species of *Asplenium*, *Woodsia*, *Polypodium vulgare* L., *Adiantum pedatum* L., *Dicksonia punctilobula* (Michx.) Gray, and *Onoclea sensibilis* L., but failed to find any trace of internal hairs in these.

With respect to the structure of the leaf-segments (Fig. 1) *D. marginalis* shows a thick-walled epidermis, and the ventral surface is frequently papillose; the palisade tissue consists of two to three strata, very compact, covering open pneumatic tissue (P*),

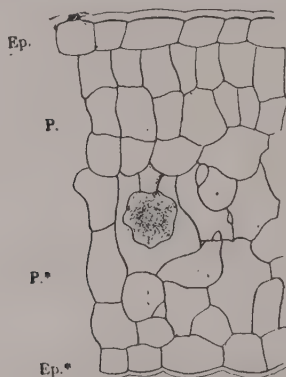


Fig. 1

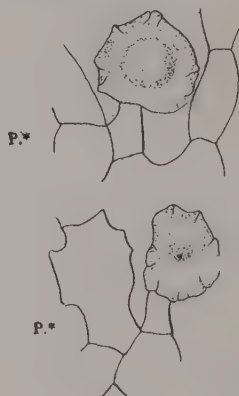


Fig. 2

Fig. 1. Cross-section of leaf-segment of *Dryopteris marginalis*; Ep., ventral, Ep.* dorsal epidermis; P palisade tissue; P* pneumatic tissue with glandular hair in intercellular space. $\times 240$.

Fig. 2. Two glandular hairs of same fern, from the pneumatic tissue. $\times 370$.

of which the intercellular spaces contain numerous, relatively large, glandular hairs. The lateral veins are embedded in the chlorenchyma, each surrounded by a large-celled, green parenchyma-sheath, inside of which is a thin-walled endodermis. In the midrib, on the other hand, is a strand of hypodermal collenchyma, which extends to the parenchyma-sheath; a strand of mechanical tissue is located in the margins. A like structure recurs in *D. Filix-mas*.

The presence of these glandular hairs in certain species, and their absence from others within the genus *Dryopteris*, to which they are referred now, might indicate some generic distinction. Moreover

the habit of the species is quite different. It may be an instance where the anatomical structure combined with the external is necessary in order to ascertain the true systematic position of these species. For this purpose I informed Mr. Christensen, the author of *Index Filicum*, about the presence of these hairs in the species mentioned above, and he kindly wrote me that this singular structure was a new proof of a probable generic distinction between *D. marginalis*, *D. Filix-mas*, *D. cristata*, and *D. spinulosa* on the one side, and *D. noveboracensis* and *D. Thelypteris* on the other.

The fact that Schmidel established the genus *Thelypteris* a year earlier than *Dryopteris* of Adanson has resulted in the transfer of all these species, including those of *Phegopteris* (Presl) Fée, to *Thelypteris*, thus involving no small amount of nomenclatorial change. To those who are familiar with these plants as they grow in nature, such classification does not appeal as being in any way natural. It may be true that rules of nomenclature are of no use unless conscientiously followed, but it is sad to think of how much time is given and in recent years has been given to hunting for old names instead of studying the plants themselves. I feel absolutely confident that an extended study of the anatomy of these ferns will reveal many facts, which will prove helpful from the taxonomic point of view.

And no critical investigator will feel obliged to submit to such rules of nomenclature, so long as they only involve endless confusion and add nothing whatever to the natural history of plants.

CLINTON, MARYLAND.

A FLORA OF THE PENOBSCOT BAY REGION.—Since the publication in 1894 of Rand & Redfield's *Flora of Mount Desert Island, Maine*, there has been great activity in the botanical exploration of the Maine coast and numerous papers have resulted therefrom, but now comes a study of more detailed character, by Mr. Albert Frederick Hill, who has spent many summers in the area. *The Vascular Flora of the Eastern Penobscot Bay Region, Maine*,¹ is a detailed enumeration and a phytogeographic consideration of the vascular flora of the region immediately to the west of Mount Desert Island.

¹ A. F. Hill, Proc. Portland Soc. Nat. Hist. iii. pt. 2, pp. 199-304, with cuts and map. \$1.50. 1919.

The paper opens with an account of the general geographic and physical features, followed by a well prepared catalogue of the flora of the mainland township of Brooklin and the adjacent insular townships of Deer Isle, Stonington, Swans Island and Isle au Haut. The region is one of great topographic charm but composed for the most part of acid rock and consequently with a meagre flora—a total of only 612 indigenous species, varieties and named forms, besides the usual introductions. On this account it is to be regretted that Mr. Hill so closely circumscribed his area, for by including the western side of Penobscot Bay with its more varied and often calcareous soils—Islesboro, Camden, Rockland, etc.—he would have added to his flora hundreds of species such as *Deschampsia caespitosa*, *Agropyron tenerum*, *Scirpus occidentalis*, *Carex aurea*, *Anemone canadensis*, *Vitis novae-angliae*, *Dirca palustris*, *Viola rotundifolia*, *Galium labradoricum* and *Erigeron pulchellus*, calcicolous or at least scarcely calcifuge plants which would have furnished a striking contrast to the group of acid-rock species which compose so much of the flora on the east side of Penobscot Bay.

In the compilation of his catalogue the author has shown great industry, and alertness to make his records complete and to bring them into accord with the latest critical studies. Aside from its great value as a local flora, therefore, the paper is a convenient compendium of references to recent monographic studies of such plants as reach Mr. Hill's area. In the main the work is carefully done, only a few minor points impressing one as inaccurate. For instance, *Lycopodium clavatum*, var. *megastachyon* is var. *monostachyon* of the *Manual* but not of Greville & Hooker, the latter plant being more boreal than ours. Similarly, *Potentilla pacifica* is not *P. Anserina* L., as the synonymy would indicate, but a distinct plant formerly included under *P. Anserina*.

The last part of the paper, "Phytogeographical Aspects of the Flora," is, most unfortunately, not of the high grade of the catalogue. The author has allowed himself to become fascinated by the alluring categories provided by Merriam's life zones and has felt obliged to thrust almost every species of his flora into a single restricted geographic pigeon-hole. The result is what might be expected, for any botanist of not too limited experience either in the field or the herbarium soon learns that "it can't be done." The majority of plants are not simply "Hudsonian," "Canadian," "Alleghanian," "Carolinian," etc.¹ Most of them occur in two or more of these

¹ Merriam's zones were defined chiefly by the characteristic animals: the HUDSONIAN, "the northern part of the great trans-continental forest . . . stretching from Labrador to Alaska. . . . In the north inhabited by the wolverine, woodland caribou, moose [probably better "Canadian"—see Scharff, *Distrib. and Origin of Life in Am.* fig. 3]. . . . In the eastern United States . . . restricted to the cold summits of the highest mountains"; the CANADIAN, "the southern part of the great trans-continental coniferous forest of Canada, the northern parts of

so-called zones, and anyone who has carefully mapped the detailed ranges of hundreds of species knows that no two maps are alike. In fact it is difficult from Merriam's definition to determine where the Carolinian begins for no two of the trees he indicates as indices have coincident northern limits. It is natural to attempt to sort the species into groups of similar range, but we are inclined to make our groups altogether too limited in number. As Colonel Harvey so aptly says of the sociologists' attempts to classify all human beings into a few categories, "There is no especial harm and there is much mental exercise to be obtained from reducing all mortality to these few theoretical types—no especial harm, that is, supposing that one bears ever in mind what a constant whopper is involved in the reduction of any individual to a type."¹

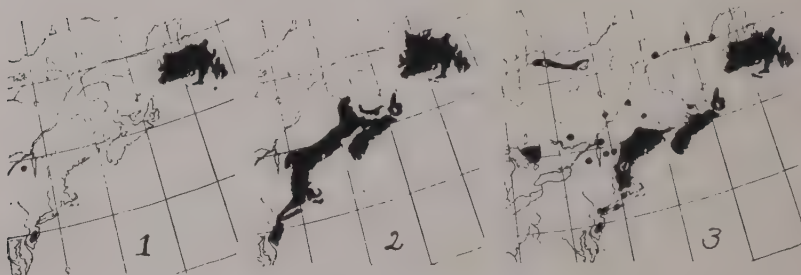
Unfortunately, however, in the *Flora* before us the author seems not to have obtained "much mental exercise" in reducing all his plants to restricted geographic groups. At least it would be astonishing to a resident of Maryland or of Missouri, where *Galium triflorum* is common in woods, to find it classed unreservedly as a "Hudsonian" plant,—the more so since in the eastern part of the American continent we do not know it north of the southernmost border of Canadian Labrador. Similarly, *Dryopteris spinulosa*, *Deschampsia flexuosa*, *Festuca rubra*, *Arenaria lateriflora* and numerous others classed by the author as "Hudsonian" are surely common throughout most of southern New England and often much farther south, and most of them do not characterize Hudsonian areas. The same lack of very clear visualization of actual ranges of plants which is responsible for the above classifications is too apparent in succeeding lists: *Polygonum sagittatum*, *Ilex verticillata* and *Cornus alternifolia*, which extend from Florida, Alabama or Texas to southern Newfoundland and southernmost Canada, classed as "Canadian"; *Carex novae-angliae*, which occurs from Newfoundland to the mountains of New York and northern Pennsylvania [a splendid example of Canadian range], called "Alleghanian"; and *Juncus Greenei*, which covers the mountains of western Maine and northern New Hampshire (up to

Maine, New Hampshire, and Michigan. . . . In the East it covers the Green Mountains, Adirondacks and Catskills, and the higher mountains" to western North Carolina and eastern Tennessee. "Among . . . characteristic mammals and birds . . . lynx, marten, porcupine, . . . spruce and dusky grouse, cross-bills and Canada jays"; the ALLEGHANIAN, "the greater part of New England, south-eastern Ontario, New York, Pennsylvania . . . and the Alleghanies . . . to Georgia," characterized by "chestnut, walnut, oaks, and hickories"; the CAROLINIAN, occupying "the larger part of the Middle States, except the mountains . . . on the Atlantic coast it reaches from near the mouth of Chesapeake Bay to southern Connecticut, and sends narrow arms up the valleys. . . . Counting from the north, the Carolinian area is that in which the sassafras, tulip tree, hackberry, sycamore, sweet gum, rose magnolia, red bud, persimmon and short-leaf pine first make their appearance."

¹ Harvey's Weekly, ii, no. 47, pp. 12, 13 (Nov. 22, 1919).

3800 feet) and reaches its southern limit as a very rare plant in north-central New Jersey, classed as "Carolinian." But the most startling example of Hill's conception of a "Carolinian" plant is *Aster nemoralis*, an unusually distinct species which occurs from the bogs and mountains of Newfoundland to Hudson Bay and northeastern Massachusetts and southward very locally in cold bogs to the pine barrens of New Jersey. Yet, in spite of this well known distribution, the author presents a map purporting to show the "Carolinian" range of the plant.

Just why *Aster nemoralis* has been singled out for vague and unsupported generalizations by recent phytogeographers, who have not taken the slight trouble to look up either the large herbaria at hand or the equally accessible literature, it is difficult to say, unless, perhaps, it is the unusual color (for an *Aster*) of its pink rays. In his *Flora of the Vicinity of New York* in 1915, Taylor laid great emphasis¹ upon the supposed absence of *A. nemoralis* from the area between New Jersey and Newfoundland (a range indicated in Fig. 1), from which fictitious data he drew far-reaching conclusions; but, as the present reviewer² pointed out at that time, he had quite ignored



Figs. 1-3. *ASTER NEMORALIS* Ait.

Range, fig. 1, as defined by Taylor; fig. 2, as published by Hill; fig. 3, as shown by the Gray Herbarium and standard local floras.

the abundant literature and the scores of herbarium-specimens which showed *A. nemoralis* to grow in every province and state (except Connecticut) between Newfoundland and New Jersey! The author of the *Flora* now under discussion has certainly read the latter review; nevertheless, he now publishes a map which is as misleading as was the imaginary statement of range above referred to. Hill gracefully acknowledges the placing at his disposal of the facilities of the Gray Herbarium, but a brief five minutes spent in looking up the material of *Aster nemoralis* in that collection would have shown it from the Natashquan River, entering the Gulf of St. Lawrence from the Lab-

¹ Taylor, Mem. N. Y. Bot. Gard. v. 24 (1915).

² Fernald, RHODORA, xvii. 68 (1915).

rador Peninsula; from Rupert River, entering Hudson Bay also from the Labrador Peninsula; from the shores of Georgian Bay and elsewhere in Ontario and northern Quebec; while reference merely to Macoun's *Catalogue* would have revealed other stations in the North: Lake Mistassini, Muskoka, etc.

This is not a matter of opinion nor a difference of interpretation. It is a statement of the quickly accessible facts which the author failed to get at. But why, without making sure to look up the most available sources of information, place before the always receptive botanical public such a map as is here reproduced in Fig. 2 (Hill's map), when it would have been almost as simple to prepare an approximately correct one, as indicated in Fig. 3? The author of Fig. 2 has colored solidly all of eastern New Brunswick, as well as all of southeastern Massachusetts (including Nantucket) and all southern Connecticut; but neither Fowler nor Macoun list *Aster nemoralis* in New Brunswick from northeast of the extreme southwest corner of the province; the reviewer, who has extensively explored in both eastern New Brunswick and in southeastern Massachusetts, knows of no evidence of the *Aster* in either area; and Bicknell, who certainly knows Nantucket, does not record the species from there. Neither is it mentioned in the Connecticut Botanical Society's *Catalogue of the Flowering Plants and Ferns of Connecticut*. In fact, the only authentic record from Connecticut seems to be that of a single station in Thompson,¹ the northeasternmost town of the state.

Other maps published by Hill display the same failure to check the immediately accessible data and show the ease with which supposed ranges can be mapped by those who do not realize that errors once born never die but, on the contrary, by others not situated to know the facts are continually mistaken for the truth and consequently perpetuated. For instance, the map said to show the distribution of *Viburnum dentatum* has the solid black extending nearly across Minnesota and Tennessee; but the really alert botanists of Michigan, Minnesota or Tennessee, should they see Hill's map, may well wonder where he got his data. The herbaria examined by him do not supply them, and it is significant that Beal, who has published the standard flora of Michigan, did not know of *V. dentatum* in the state, that Gattinger did not know it in Tennessee, and that, in their *Minnesota Trees and Shrubs*, Clements, Rosendahl & Butters do not mention it.

The reviewer regrets having to write so discouragingly of a piece of work which he would like wholly to commend. The first parts are decidedly praiseworthy but, although having some excellent points, like the discrimination of a comparatively rich flora overlying the small basic area of the region, the last part unfortunately contains so many assumptions that it must be classed as another addition to

¹ Weatherby, RHODORA, xxi. 75 (1919).

our too extensive mass of publications in which the tremendously interesting facts of distribution are replaced by vague and unsupported statements. That so many authors dealing with phytogeography are content to draw their deductions from inaccurate data is amazing, for, in this subject as in all others, as Byron long ago asserted, "truth is always strange,—stranger than fiction."—M. L. FERNALD.

DR. FRANK SHIPLEY COLLINS, one of the original members of the NEW ENGLAND BOTANICAL CLUB, for three years its president and for more than twenty-one years a faithful, effective, and highly valued member of the Editorial Staff of RHODORA, died suddenly on May 25th at New Haven, Connecticut in his seventy-third year. A biographical sketch and an account of his botanical activities will appear in an early issue of this Journal.

Vol. 22, no. 256, including pages 57 to 76, was issued 7 May, 1920.

DUPLICATE BOOKS FOR SALE.

- Grisebach, A.** Catalogus plantarum cubensium. Leipzig, 1866. 8° **\$2.25**
- Kerner von Marilaun, A., & Oliver, F. W.** The natural history of plants. 4 vols. 1895. New York. 1. 8° **\$10.00**
Presents fascinatingly the relations of plants to their environment.
- Masters, M. T.** Vegetable teratology. London. 1869. 8° **\$6.00**
The one standard work in English on this subject.
- Pickering, Charles.** Chronological history of plants. Boston, 1879. 4° **\$15.00**
- Sullivant, W. S.** Icones Muscorum, 8vo., illustrated by numerous copper plates of high excellence (unbound and in sheets). Here offered at a greatly reduced price..... **\$6.00**
Supplement to the preceding (also in sheets). **\$5.00**
Icones and Supplement together..... **\$10.00**
- United States Exploring Expedition** during 1838-1842, under command of Charles Wilkes. Unbound, in sheets. Botany. Phanerogamia Part I, by A. Gray, with atlas. 1854..... **\$40.00**
- Watson, S.** Bibliographical Index to N. A. Botany. Part I (all published). Washington. 1878. 8° **\$1.25**

Address Librarian, GRAY HERBARIUM of HARVARD UNIVERSITY, Cambridge, Mass.

INDICATORS FOR DETERMINING REACTIONS OF SOILS

As used by DR. EDGAR T. WHERRY in the studies described on page 35 of the March issue of 1920. A set of six indicators, made up ready for use, in box suitable for carrying into the field. Accompanied by instructions for using them. Price \$2.85. For sale by: LAMOTTE CHEMICAL PRODUCTS CO., 13 W. Saratoga St., Baltimore, Md.

Driers Presses
Collecting Picks

Mounting Papers
Collecting Cases

Genus Covers
Herbarium Supplies

CAT. 91,—BOTANICAL. CAT. 92,—BIOLOGICAL, SLIDES, ETC.

Microscopes

Accessories

Lenses

CAMBRIDGE BOTANICAL SUPPLY COMPANY

Laboratory

WAVERLEY, MASS.
8 Lexington Street

Equipment